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Soil Survey
of
The Lovington Area, New Mexico

By

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Bureau of Chemistry and Soils

In cooperation with the New Mexico Agricultural
Experiment Station

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SOIL SURVEY

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SOIL SURVEY OF THE LOVINGTON AREA, NEW MEXICO

By W. G. HARPER, in Charge, and L. H. SMITH

AREA SURVEYED

The Lovington area, covering 1,315 square miles, or 841,600 acres, includes that part of Lea County in which water lies at a depth of approximately 50 feet below the surface (fig. 1). The area, which occupies a strip extending about 25 miles east and west and 50 miles north and south, comprises about one-third of Lea County and is bordered on the east by the Texas State line. Lea County is located in the southeastern corner of New Mexico. Lovington, the county seat, is about 100 miles east of Roswell, N. Mex., about the same distance south of Clovis in the same State, and about 120 miles west of Lubbock, Tex.

The entire area lies within the southwestern part of the Llano Estacado, or staked plains, which constitute the southern extension of the high plains.

The high plains are remnants of a vast deposit of soil and rock debris spread by eastward-flowing streams along the eastern front of the Rocky Mountains and the mountain ranges of central New Mexico. Geologically, these deposits are probably mainly of Tertiary age. The high plains of which this area is a part slope eastward, passing imperceptibly into the lower plains of western Texas. In most places, however, they are bounded on both the east and west by an abrupt escarpment ranging from 100 to 300 feet above the surrounding lower plains.

Within the area surveyed, the plain is very flat treeless grassland that is almost unbroken in relief by dissecting streams or noticeable ridges. In the eastern part of the area a few spots are characterized by a billowy dunelike surface relief. These spots are from 4 to 10 feet higher than the general surface level, and near the southern part of the area the heads of a few valleys of intermittent streams, in the form of gullies and draws, have become established in the general area of erosional degradation where the plateau breaks and descends to lower lying land. The plain is without perennial streams, but throughout most of the area a number of slightly depressed drainageways or incipient stream channels occur, that range from a few hundred feet to a few miles in length and terminate in depressions of generally circular form, locally known as playas.

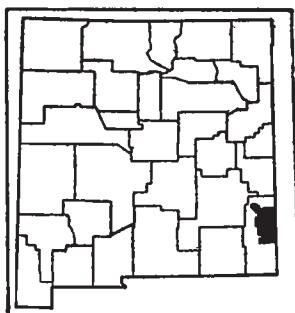


FIGURE 1.—Sketch map showing location of the Lovington area, N. Mex.

These playas range from about 1 foot to as much as 40 feet below the level of the plain, and from 10 to several hundred feet in diameter. Following periods of heavy rainfall, some of the water is absorbed immediately by the soil, but in many places, where the soil or rock material is not porous, water enters the drainage channels and flows into the playas, where it either percolates gradually to lower depths, or remains until it evaporates. The percolating waters from the playas dissolve parts of the underlying limestone formations and carry the material away in solution, causing the surface to sink in places. Evidence of such settling is apparent in many of the playas, although a few appear to have been puddled and hold water as a lake.

The elevation of the plains at the northwestern boundary of the area is about 4,000 feet and in the southeastern part is about 3,500 feet above sea level.¹

The area comprises a grassland plain whereon the short grasses predominate. The grama grasses, buffalo grass, and annual short grasses, together with a number of small herbaceous plants, form a moderately dense cover and sod on the medium-textured soils; the needlegrasses and yucca on the medium light textured soils; and sage grass and andropogons (coarse bunch grass) on the very sandy soils. Besides these, *Gutierrezia*, by some called turpentineweed or snakeweed, is common over large areas of overgrazed lands. Mesquite brush grows sparingly over the entire area but is more common and grows taller in the southern part, where, in depressions, much of it is from 8 to 10 feet high. Catclaw, a woody shrub, is common on medium light textured soils, and small shin oak forms the principal vegetation on the sandy lands near the eastern and southern margins.

Lea County was organized in 1917 from parts of Chaves and Eddy Counties. Its territory has been utilized for livestock grazing for many years. Many farmers came into the State and homesteaded 160 acres between 1916 and 1920. The census reports the population of the county as all rural and numbering 3,545 in 1920, and in 1930, 6,144. The farm population is more dense around Lovington and in the sections north and northeast of that town and extending to Tatum and Bronco. Fewer people live on the rough sandy lands along the Texas border, in the southern part, and near the western and northwestern margins of the area. The average density of the population, which is made up almost entirely of American-born whites, is 1.4 persons a square mile.

Following the discovery of oil near Hobbs and Jal in 1928, a rapid expansion of the oil-producing industry occurred, but this has declined since 1930. Lovington, the county seat, had a population of 961 in 1930; Hobbs, 598; and Jal, 404. Tatum is a town of some importance. It is a school center on United States Highway No. 380 and serves also as a farm center. Humble City, Monument, McDonald, and Plainview are important school centers. The area is well supplied with rural school buildings, some of which are centers of large consolidated school districts. Telephones serve some of the ranch homes. Churches are located at Hobbs, Lovington, and Tatum.

¹ Topographic map of New Mexico. U. S. Geol. Survey sheets.

The area is traversed by the transcontinental United States Highway No. 380 which connects with other highways extending throughout Texas and New Mexico. The highways are well graded and are paved with caliche, a soft rock of calcium carbonate. Many private and secondary roads reach the various ranches throughout the area. A branch line of the Texas & Pacific Railway serves as a transportation outlet, extending from Lovington through Hobbs to the main line at Monahans, Ward County, Tex., about 80 miles south of Lovington. The oil industry, with its 155 producing wells, is the principal enterprise, other than agriculture.

CLIMATE

The climate is semiarid, but, as most of the rain falls during the growing season, crops are produced without irrigation during the wetter years. Precipitation occurs mostly as rainfall from thunderstorms, occasionally as sleet or hail, and it differs greatly in amount over small local areas. The northern part of the area, according to United States Weather Bureau records, receives about 2 inches more rain annually than the southern part. The average annual rainfall at Lovington is 14.05 inches, and the average annual snowfall is 6.7 inches. Snow melts and disappears within a few days. The atmosphere is dry, evaporation rapid, and the mean annual temperature is comparatively high, 60° F. A very large number of the days are clear.

The average length of the frost-free season, extending from April 2 to October 30, is 212 days. Occasional sudden changes in temperature to below freezing during the spring are unfavorable and cause injury to early-blooming fruit trees and young grasses. Frost has been recorded as late as May 7 and as early as October 15.

The prevailing wind during the summer blows from the southeast. Normally, the wind movement is very slight during this season, but during the fall, winter, and especially during the spring, the winds are of high velocity and considerable injury to growing crops is caused by the drifting of sandy soils. The comparatively light rainfall and high rate of evaporation make this a marginal dry-farming area, and crop yields are uncertain.

The annual average evaporation from an exposed water surface at the experiment station at Lubbock, Tex., for a 16-year period, was found to be 62.15 inches. The average wind velocity at Lubbock for a 16-year period is 7.4 miles an hour. The highest winds are during March, April, and May.

Table 1 gives the more important climatic data, as compiled from records of the United States Weather Bureau station at Lovington. These data are considered representative of climatic conditions in the area.

TABLE 1.—*Normal monthly, seasonal, and annual temperature and precipitation at Lovington, Lea County, N. Mex.*

[Elevation, 3,900 feet]

Month	Temperature			Precipitation			
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1917)	Total amount for the wettest year (1914)	Snow, average depth
December.....	°F. 41.3	°F. 75	°F. 4	Inches 0.47	Inches 0.00	Inches 1.63	Inches 1.3
January.....	41.9	81	-10	.28	.13	(¹)	1.8
February.....	45.6	84	3	.47	(¹)	.22	.7
Winter.....	42.9	84	-10	1.22	.13	1.85	4.3
March.....	52.1	87	1	.44	.10	.20	1.0
April.....	59.4	94	16	.85	(¹)	.88	(¹)
May.....	67.3	100	24	1.13	.53	2.31	0
Spring.....	69.6	100	1	2.42	.63	3.39	1.0
June.....	75.7	107	42	1.81	.07	3.10	0
July.....	78.0	104	54	2.38	.43	3.87	0
August.....	77.6	104	45	1.85	1.11	1.89	0
Summer.....	77.1	107	42	6.04	1.61	8.86	0
September.....	71.4	99	35	2.16	2.67	1.84	0
October.....	60.1	93	20	1.62	(¹)	6.73	(¹)
November.....	49.4	83	6	.59	.11	1.02	1.4
Fall.....	60.3	99	6	4.37	2.78	9.59	1.4
Year.....	60.0	107	-10	14.05	5.15	23.69	6.7

¹ Trace.

AGRICULTURE

The grassy plains comprising this area have long been used for livestock raising alone, without any cultivation of the land. To comply with homestead laws, a small part of each 160 acres was broken from sod. As a rule, the best land was selected for this purpose, and most of the tracts have been used for crop growing up to the present time. Other tracts, however, were soon abandoned, the medium- and heavy-textured soils having slowly reverted to grass, whereas some of the light-textured sandy soils have been blown into a dunelike condition which renders them unsuitable for cultivation.

The 1930 census enumerates 610 farms in Lea County, several of which include more than 15,000 acres. Between Lovington and Tatum and east of McDonald, many farms include 640 acres or less. The average proportionate farm-property values in the county in 1930 were as follows: Land, 63.7 percent; buildings, 5.1 percent; implements and machinery, 2.1 percent; and domestic animals, 29.1 percent. The average value of land and buildings was \$4.71 an acre. Of the 610 farms, 78.8 percent were operated by owners, 19 percent by tenants, and 2.2 percent by managers. Some land is leased for cash. On many ranches no farm machinery is used, but the more commonly used machines on the rest are a plow, a lister, a corn planter, a cultivator, and a corn binder. A few small tractors are used, but most of the farmers use horses as motive power. Most of the farm work is done by the owners, but hired help is necessary

on the sheep ranches at lambing time. Nearly all the hired laborers are native whites, and a few are Mexicans.

Tables 2 and 3 give some of the more important agricultural data taken from reports of the 1930 census.

TABLE 2.—*Acreage and production of the principal crops in Lea County, N. Mex., in 1929*

Crop	Acres	Production	Crop	Acres	Production
		Bushels			Tons
Corn.....	3,393	39,138	Alfalfa.....	5	20
Potatoes.....	2	195	Cotton.....	319	183
Sweetpotatoes and yams.....	7	689			

TABLE 3.—*Number and value of domestic animals on farms and ranges in Lea County, N. Mex., in 1930*

Animal	Number	Value	Animal	Number	Value
Horses.....	3,858	\$138,212	Goats.....	2,078	\$9,460
Mules.....	640	35,111	Swine.....	986	10,932
Cattle ¹	74,603	3,284,488	Chickens.....	23,531	17,648
Sheep.....	77,260	505,243			

Mainly beef cattle.

The raising of beef cattle (mainly Herefords) on the range is by far the most important agricultural enterprise, and sheep raising ranks second. The area is naturally well suited to livestock raising. The cattlemen depend largely on the natural grasses for bulk feed, and this is supplemented by forage grown on the farm. Where farming is carried on largely in conjunction with livestock raising, parts of nearly all the soil types are cultivated. The stockmen, however, recognize the soils best suited for cultivation, and many of them have located their farm headquarters adjacent to the better producing soils of their holdings. As a rule, the farmer is familiar with each of the five groups into which the soils of the area may be conveniently assembled.

Nearly 80,000 head of beef cattle are pastured on the open range. There are 4 or 5 breeders of purebred Hereford bulls in the area. From 15 to 25 cattle a section (640 acres) are kept, mostly on pasture feeds. During periods of extended drought and during the colder parts of the winter, when grass is scarce, most stockmen feed cotton-seed cake and some forage. The cake is shipped in by rail and, more commonly, by truck from points in New Mexico or Texas, and some alfalfa hay is trucked in from the Pecos Valley near Roswell or Carlsbad. Calving takes place in winter or early spring, and the calves are marketed in October or November when they range from 350 to 400 pounds in weight. They are shipped as feeders and sold at points in Colorado, Kansas, Oklahoma, and Iowa. The average yearly calf crop, as locally reported, amounts to 60 or 70 percent of the total number of breeding cows, and some stockmen are said to obtain a larger proportion of calves. Losses of cattle are principally due to hemorrhagic septicemia, and some losses are caused by blackleg, poisoning from the leaves of shin oak, and perhaps a few

animals are poisoned from locoweed. Hemorrhagic septicemia may be controlled by two vaccinations a year and blackleg by one vaccination.

There are about 75,000 sheep in the area, principally of the Rambouillet type. From 100 to 150 head of sheep are pastured on a section (640 acres), and, as is done for cattle, oil cake is fed during cold weather and during extended periods of drought and scant grass feed. The lambing season occurs in April. From 70 to 80 percent of the breeding herd is the average proportion of the lamb crop. The lambs are sold and transferred in October to out-of-State feeding sections. When marketed, they weigh from 50 to 60 pounds. Sheep shearing is done in June, and the wool, as a rule, is sold immediately to buyers who come to the area at shearing time. The average ewe shears about 8 or 9 pounds of wool. Some loss of sheep is caused by hemorrhagic septicemia, some by stomach worms, and a few sheep are poisoned by milkweed, larkspur, western goldenrod, and locoweed. Hemorrhagic septicemia may be controlled by two vaccinations a year, and stomach worms may be partially exterminated by the use of a drench of copper sulphate.

Besides beef cattle and sheep, there are about 4,000 dairy cattle, principally Jerseys, with a few Holstein-Friesians. Many of the dairy cattle are kept to furnish products for home use, but a few farmers sell their dairy products in local markets. Some cream is shipped by truck to Lubbock, Tex., and Roswell, N. Mex.

On most farms, enough chickens are kept to supply home and local demands. A few hogs are raised and butchered for local and home use. The number of turkeys is increasing. Turkeys of the Bronze variety do very well.

Each of the soils in the area, except scab land, is cultivated to some extent, but Lea loam, Springer loam, and Springer fine sandy loam are more commonly preferred and more largely utilized. As has been stated, most of the farming is carried on in connection with livestock raising, forage being grown to supplement the native range grasses. The crops grown and methods of cultivation employed are rather uniform on all soil types. Grain sorghums, sorgo, and corn are the chief crops produced for livestock feeding. Hegari is the principal variety of grain sorghum, and some milo, kafir, and feterita are also grown. Redtop or Sumac, Honey Drip, Gooseneck or Texas, Seeded Ribbon, and old Mexican or Mortgage Lifter comprise the principal sorgos. Sudan grass is grown for seed rather than for forage.

The preparation of land for these crops is identical with that for all other crops produced. The land, if in sod, is plowed but if it has been previously cultivated, it is listed into rows and furrows, generally in the fall when the ground is moist, as in this condition the soil compacts and sticks together somewhat when worked, and it will withstand wind erosion much better than if listed when dry. During the winter and early spring the lister rows become approximately leveled by the wind-shifted soil material. In the spring, when the land is moist, it is again listed, and the sorghums and corn are planted in late May and June. Plantings are made with a 1- or 2-row lister planter. About three cultivations are made during the summer, and the crop is harvested in September or October.

The heads of milo are generally harvested, and the stalks are pastured, but the other sorghums and corn are harvested with a corn binder. Bundles are stacked and fed during periods of drought or when there is a shortage of grass in the winter. The heads of milo are cut following the first frost, and when the ears of corn are harvested separately, they are snapped in October or November. From one-fourth to one-third of a ton of grain heads an acre is ordinarily harvested from the grain sorghums, 1 ton of the grain heads being equivalent to about 28 bushels of threshed grain. These sorghums yield from about $1\frac{1}{2}$ to 2 tons of coarse forage an acre. The sorgos yield a slightly larger amount of forage. Corn yields about 15 bushels of grain an acre and from three-fourths to 1 ton of forage. The principal varieties of corn are Mexican June, Surcropper, and Iowa Silvermine.

Pinto beans are produced for home use and for local markets. They are given about the same care as the sorghums. They are harvested in September and threshed by hand. Yields ranging from 25 to 400 pounds an acre are reported. Cowpeas, which are grown to a small extent, are planted between rows of corn, 1 row of peas and 2 rows of corn being the common practice. Following harvesting of the corn, the cowpeas are usually pastured.

Cotton is a cash crop, but the acreage is small and unimportant. Kasch, Acala, Half-and-Half, and Mebane are the chief varieties grown. Cotton is planted from May to early June, and it matures in October. A cotton gin was constructed at Lovington and one at Tatum about 1917, but not enough cotton has been produced to justify their continued use, and at present cotton is hauled to points in Texas for ginning. Local information states that commonly the yields of cotton range from one-fourth to one-third of a bale an acre.

A number of other crops are produced under irrigation, and on some dry-farmed land crop yields are increased by supplemental irrigation. Local farmers estimate that under irrigation the grain sorghums yield from 1 to 2 tons of heads (28 to 56 bushels of grain) an acre; corn, from 40 to 50 bushels; cotton, 1 bale; pinto beans, from 500 to 600 pounds; and sorghums for forage, from 3 to 4 tons. Other crops of importance are onions, sweetpotatoes, field corn for the roasting-ear market, hill and pole beans, tomatoes, peanuts, lettuce, melons, squashes, carrots, beets, strawberries, and a few other vegetables and truck crops. These are grown for home use and for local markets. The onions grown are chiefly of the Bermuda and Valencia varieties. They are harvested in September, and acre yields of about 20,000 pounds are reported.

The Nancy Hall, locally known as the Bradley yam, and the Porto Rico varieties of sweetpotatoes are grown. The seed is bedded in April, the slips are set in the field on ridges in May, and the crop is harvested following the early frosts, usually in September and October. Some of the sweetpotatoes are dug green and sold in August and September. Yields of 250 bushels an acre have been reported on good types of soil.

A number of insect pests and some diseases affect crops in this section. The blister beetle is probably the most prevalent and most difficult to control, and as yet it has not been dealt with successfully.

Other insect pests, which may be controlled by the use of sprays and dusts, are the leaf hopper, bean beetle, aphids, cornstalk borer, false chinch bug, and a sharpshooter that stings the flower of cotton, causing it to fall off. Arsenical and other sprays and dusts are used. Nicotine sulphate is used mostly for aphids. Anthracnose, a fungous disease, attacks cotton and beans. The army worm invades the area during some seasons. The production of tomatoes is sometimes lessened by tomato blight.

Fruits, mainly apples, plums, prunes, and cherries, are grown for local consumption on many ranches. The production of peaches is very uncertain, because of late frosts following warm periods of weather that hasten the trees into bloom. Frosts occasionally injure or destroy the yields of early-blooming fruit trees. Some grapes of both American and European varieties are produced. The tree fruits are more or less injuriously affected by a few controllable pests, and to some extent by sun scald.

SOILS AND CROPS

The soils of the area have been placed in five groups—(1) dark-brown soils, (2) reddish-brown soils, (3) red sandy soils, (4) gray or white soils, and (5) scab land.

In the following pages of this report, the soils of the Lovington area are described in detail and their agricultural relationships are discussed; their location and distribution are shown on the accompanying soil map; and their acreage and proportionate extent are given in table 4.

TABLE 4.—*Acreage and proportionate extent of the soils mapped in the Lovington area, N. Mex.*

Soil type	Acres	Percent	Soil type	Acres	Percent
Lea loam.....	54,208	6.5	Springer fine sandy loam, rolling phase.....	37,062	4.5
Lea loam, overblown phase.....	18,112	2.2	Reagan loam.....	32,192	3.8
Lea clay loam.....	1,162	.1	Reagan fine sandy loam.....	39,744	4.7
Lea silty clay loam.....	42,880	5.1	Scab land.....	503,872	59.9
Lea clay.....	2,752	.3	Total.....	841,600	-----
Springer loam.....	63,872	7.6			
Springer fine sandy loam.....	44,864	5.3			

DARK-BROWN SOILS

The group of dark-brown soils includes Lea loam, Lea loam, overblown phase, Lea clay loam, Lea silty clay loam, and Lea clay.

Lea loam.—Lea loam has a topsoil layer about 8 inches thick of dark-brown friable noncalcareous loam that, under virgin conditions, contains many grass roots. Beneath this, and continuing to a depth of about 14 inches, the soil material is of about the same color as the surface layer, but it is slightly heavier in texture and contains a very small quantity of carbonate of lime. Below this horizon and extending to a depth averaging 22 inches, the soil is brown or grayish brown, the gray color being attributable largely to an accumulation of carbonate of lime. Although no developed structure is noticeable in the topsoil layers, this lower layer has a very noticeable granular structure. Many fine grass roots and a number of

wormholes and worm casts are present. Beneath a depth of 22 inches and extending to a depth of about 40 inches the subsoil is gray calcareous silty clay loam that is somewhat firm, owing to the cementing action of the dried carbonate of lime. When forcibly broken, the material breaks into nodulelike, irregular shaped clods. This horizon becomes richer in carbonate of lime with increase in depth, and in most places at a depth of less than 6 feet it grades into white marl or a hard stonelike bed of calcium carbonate caliche.

In virgin areas this soil supports a dense grass cover consisting principally of grama.

Lea loam occurs dominantly in long narrow parallel strips, many of which are only a few hundred yards wide and 10 miles long stretching from northwest to southeast. They are not of equal width, however. Knots, or ganglionlike enlargements, occur on them. These have a somewhat systematic occurrence, a large number occurring on all or many of the strips along approximately the same meridional line or belt. One such belt runs slightly northeastward by Lovington, and another runs parallel to it about 7 miles east of Lovington. These belts unite into a larger wholly irregular "ganglion" about 12 miles north of Lovington. These seem to be belts along which more of the southeastwardly marching sand was arrested in its flight than elsewhere.

The larger individual areas range from 600 to 2,000 acres in extent and are mainly in the eastern part of the area. Over much of the rest of the area, this soil occurs in small bodies or as narrow strips occupying slight depressions. It is locally recognized as the most desirable and one of the most productive soils of the area.

Lea loam, overblown phase.—The loam texture of the overblown phase of Lea loam is caused by a mixture of sand, silt, and clay. The sand seems to consist of small remnants of sand blown southeastwardly across the area at some earlier time. A large area of accumulated sand lies in Texas immediately east of this area, the western border of it extending across the State line for a distance of a few miles. Similar sandy accumulations cover a large area in New Mexico south of the Lovington area. It is apparent that at least a considerable part of this sand has been swept across this area, presumably from the Pecos Valley lying about 50 miles west of Lovington. In a few localities a thin coating of sand overlies Lea loam. Such bodies, where large enough to map, have been designated as an overblown phase of Lea loam. These bodies lie mainly in the eastern half of the area, most of them close to the western boundary of the very sandy soils designated as Springer fine sandy loam.

Lea clay loam.—Lea clay loam is essentially identical with Lea loam in all respects except in the texture of the surface soil. The surface soil of the clay loam consists of dark-brown clay loam rather than dark-brown loam as in the loam type, and the underlying layers are somewhat heavier in texture than the corresponding layers of the loam.

In extent, this soil is wholly unimportant, as the total area includes only 1,152 acres occurring in many very small bodies in the northern part of the area. This soil is a little less productive than Lea loam for cultivated crops. In agricultural characteristics it closely resembles Lea silty clay loam.

Lea silty clay loam.—Lea silty clay loam is essentially the same soil as Lea clay loam, the only difference between the two soils being a slightly heavier texture in all the soil layers from the surface downward. The difference between the clay loam and the silty clay loam is not so great as between the loam and the clay loam.

The surface soil, to a depth of about 12 inches, is dark-brown silty clay loam. Downward, this material changes rather gradually to brown silty clay loam which may or may not be present but where present is only a few inches thick and grades rapidly into grayish-brown material containing a great deal of calcium carbonate as marly material.

This soil is distributed also in long narrow belts about as wide and as long and with the same southeastward course as the belts of Lea loam. The knots, or ganglionlike enlargements, of the latter soil are absent from the belts of Lea silty clay loam.

These belts are massed predominantly in two parts of the area—in the east-central part and in the west-central part somewhat north of the latitude of the main body of the eastern area.

Lea clay.—Lea clay consists of the heavy clay soils lying in small basins, probably all of which were formed by the sinking, owing to underground solution, of the limestone-like layer of calcium carbonate which underlies the whole region. In the scab land areas, where most of the basins occur, this rock lies beneath only a very few inches of soil.

Lea clay consists of very fine grained material washed into the basins from the surrounding soils. This material is very fine grained because, as a rule, the basins do not have a drainage area extending more than a few hundred feet beyond the basin itself, so that no currents of sufficient strength to carry coarse material flow into them.

The soils in the basins range in color from gray to black in the surface layer and from well drained to poorly drained. In the poorly drained bodies the soils are in general lighter in color than in the well-drained areas, and many of the more poorly drained bodies are too wet to support a good grass cover.

The surface soil is underlain by a heavy clay subsoil, in most places somewhat heavier than the surface soil. Beneath the heavy layer, ranging to a depth of 2 feet from the surface, the material ranges widely in character but is predominantly grayish brown and calcareous.

This soil occurs in small bodies scattered over the entire area. The land is not used for crop growing, as a rule, as its productivity is low, partly because of the heavy texture of both surface soil and subsoil.

REDDISH-BROWN SOILS

Springer loam.—Springer loam closely resembles the Lea soils. It is less sandy than the other members of the Springer series.

The surface soil is dark reddish-brown loam similar to the surface soil of Lea loam, except in the presence of a somewhat red shade to the color. The darkness of the color is a little less dense than that of the Lea soil also, and the dark-colored layer is slightly less thick. The subsoil is brown, with a distinct shade of red, and the zone of calcium carbonate lies slightly lower than in the Lea soils.

As a whole, this soil is slightly less productive than Lea loam, but it has better water-absorbing capacity than the heavier members of the Lea series. It is associated with the Lea soils, mainly the loam, occurring principally in the Lovington belt of ganglionlike expansions of the belts, or strings, of Lea loam and in the area 12 miles north of Lovington where the two belts of such expansions unite.

RED SANDY SOILS

Springer fine sandy loam.—The principal soil of the third group is Springer fine sandy loam. This soil is developed on the sandy materials lying mainly along the eastern and southern borders of the area, and it seems to have developed from sandy material accumulated presumably by wind. The layer of sandy material ranges widely in thickness, but it is more than 3 feet thick and therefore thicker than the normal soil layer. It is presumably underlain by limestonelike material like that underlying the rest of the area, but such material does not seem to have influenced the formation of the soil.

The surface soil is brown or light brown, ranging in some places to dark brown, and it is light sandy loam or loamy sand in texture. This layer is underlain by somewhat red, reddish-brown, or brown sandy clay or clayey sand. This material is structureless, except for a breakage, on exposure in a bank, into prisms formed by cracks surrounding them. Most of the prisms range from 4 to 6 inches in diameter, and they are somewhat irregular. This layer is underlain, at a depth ranging to several feet, by a layer of sand or sand and clay, which is looser than the material in the second horizon. The lower part of the second, or sandy clay, layer contains accumulated calcium carbonate.

This soil is inherently less productive than Lea loam, but under favorable moisture conditions it will produce good crops of sorghums, corn, and some of the vegetables commonly grown.

In addition to the larger bodies of this soil along the eastern and southern borders of the area, a number of smaller bodies occur in the interior, associated mainly with the Lovington belt of ganglion-like areas of Lea loam and with the larger area of bodies of Lea loam about 12 miles north of Lovington.

Springer fine sandy loam, rolling phase.—Considerable areas of Springer fine sandy loam occur in the form of dunes or at least with rolling relief. They are in general the product of sand accumulation in dune form. The sandy surface soil is loose and thicker than in the typical soil, and the depth to the sandy clay layer is greater. Therefore, this rolling soil is less productive than the typical soil.

GRAY OR WHITE SOILS

The Reagan soils are locally called gray or white land.

Reagan loam.—Reagan loam is gray highly calcareous loam with, in places, a dark shade, to a depth of about 1 foot. The subsoil does not differ essentially in character from the surface soil, though some of the abundant calcium carbonate is present in the subsoil in the form of nodules.

This soil occurs in places where the fine calcareous material lying between the indurated limestonelike layers has been accumulated on

the surface or where unusually thick layers of it outcrop. It is essentially marl, like that beneath the Lea soils, with which a small quantity of sand has been mixed.

This soil is exceptionally high in finely divided lime carbonate, and it is less productive than Lea loam.

Reagan loam occurs in a number of irregularly shaped bodies, mainly in the vicinity of Lovington, in the southeastern part of the area, and in the northern part.

Reagan fine sandy loam.—Reagan fine sandy loam occurs in a rather large number of bodies in the central belt of the area but mainly as a fringe along the western border of the large bodies of Springer fine sandy loam in the southern part. It consists apparently of bodies in which Reagan loam has been covered by sand, mixed with the finer grained material, or, along the border of Springer fine sandy loam, has suffered erosion by wind. In such places the sandy surface soil and the sandy clay have been mainly blown away, leaving the zone of carbonate accumulation exposed. Enough sand has become incorporated in it to give the surface soil a fine sandy loam texture.

This soil is no more productive than Reagan loam. Calcium carbonate being present in large amounts may react with the iron or manganese and render the Reagan soils insoluble to plant-nutrient solution. A part of these soils is utilized for crop production, and fair yields are obtained where the soil is deep and special care is given. The content of carbonate of lime varies, and as a rule the more productive areas carry a smaller than normal amount of this material.

SCAB LAND

The shallow or rocky land is mapped scab land. It is too shallow to be of value for cultivated crops, but in most places it supports a dense growth of grasses or weeds. It comprises 59.9 percent of the area. It is characterized by a thin layer of soil which in many places contains a considerable quantity of fragments of the underlying hard caliche. This caliche is mostly fragmental at the surface but beneath it is of the consistence of hard limestone to a depth which ranges between rather wide limits.

This land is known throughout the area to be suitable only for pasture land. In mapping the soils of the area some small bodies of tillable soils were included with scab land. In some localities scab land and Reagan fine sandy loam merge throughout such a wide zone of change that the exact separation is not feasible on a small-scale map. Many such areas occur near Hobbs. The soils comprising scab land, all of which are very shallow, are predominantly brown and of loamy texture, but neither color nor texture is entirely uniform over the area. In the vicinity of the reddish-brown soils, the color is brownish red and the texture is fine sandy loam. Near some areas of the Reagan soils, scab land is brownish-gray highly calcareous loam. The grasses on this land are described in the section on native vegetation.

NATIVE VEGETATION

On this natural livestock range, much attention should be given to the native grasses and other plants. The vegetal cover here is of

the characteristic semiarid type featuring the western part of the Great Plains. It consists largely of the short grasses and low bunch grasses which have the power of lying dormant during extended periods of drought and then making a quick and rather abundant growth with every accession of soil moisture from either light or heavy precipitation. There are several woody drought-resistant shrubs, several species of cacti, and many herbaceous flowering plants that evade dry conditions by growing quickly to bloom and mature seed before the moisture supply is exhausted.

The grass association is made up largely of the smaller bunch, or grama, grasses. Hairy grama is the most abundant, and with it are associated blue grama and tall or side-oats grama. Buffalo grass is abundant and comprises the true short grass of the region. *Muhlenbergia* and several other less important species of less valuable bunch grasses also occur. These grasses form a rather close cover over the larger part of the area and furnish very nutritious forage. The grass cover is most dense on the medium-textured soils, although it occurs in the same associations over the greater part of the area. On the light-textured soils, especially on Reagan fine sandy loam, Lea loam, overblown phase, and on a number of areas of scab land where the caliche is soft or fragmental, species of *Aristida* predominate. On comparatively low ground, usually on heavy-textured soils, tobosa is the dominant grass, and it is generally an indicator of a tight subsoil. This is a coarse wiry grass, little eaten by livestock after it becomes tough. In two rather large depressions, one in T. 14 S., R. 35 E., and the other in T. 15 S., R. 38 E., on highly calcareous and apparently slightly saline soils, a saltgrass, one of the species of *Sporobolus*, was seen growing to the exclusion of other grasses. In a few very similar depressions the common saltgrass, a *Distichlis*, was noticed. There is a scattered growth of *Andropogon scoparius* associated with the shin oak on the light-textured Springer soils which are commonly referred to as "shinnery land."

Intermingled with the grasses are a large number of herbaceous flowering plants, most of them small and inconspicuous, except when in bloom. One of the most noticeable is a small yellow-flowered mustard which grows abundantly over the scab land and is a very conspicuous feature of the landscape following spring rains.

Other associated plants include verbena, golden-aster, white evening primrose, yellow evening primrose, wild onion, wild yellow flax, *Quinchia lobata*, red mallow, and a thistle. A small yellow-flowered composite grows in dense patches around playas and on otherwise barren spots near mudholes or heavy soils.

Of the woody plants, mesquite brush is the most conspicuous and abundant. This thoray brush, with the exception of a few chinaberry trees, is the largest plant growing in the area. It grows to small trees 10 feet or more in height, below the plain in the southern part of the area, and over the rest of the area much of it is 8 feet tall, but most of it is much smaller. Its pods of beans furnish a nutritious feed for cattle or horses, and the thickened roots are grubbed out and used for fuel. Its distribution apparently is not governed by soil characteristics, as it grows on all the different soils of the area. In very slight depressions, where run-off water appears to accumulate, there is a rather dense growth of mesquite, whereas in other places its growth is sparse. Many square miles of the area, mostly in

the northern part, are entirely free of it. Catclaw, an *Acacia*, a low-spreading shrub with short curved spines, grows abundantly on the firm-surfaced red soils.

Shin oak grows in the very loose sandy soils along the eastern and southern borders of the area. Its leaves are eaten by cattle, and it furnishes much of the range forage in the sections where it grows. During its early period of leaf growth it is sometimes poisonous to cattle, and it is common practice of stockmen to move their cattle to a different kind of range in the spring when the leaves are forming.

A characteristic desert plant, *Gutierrezia*, locally called snakeweed or turpentineweed, is common on the stony caliche land, particularly in the southern and western parts of the area, where it is the dominant plant over thousands of acres. It is not grazed by livestock but is a common invader on overgrazed land. Sand, or narrow-leaved, sage is of comparatively rare occurrence. It is sparsely distributed on the "shinnery land" and in a few isolated draws.

The common *Yucca* of the Great Plains is abundant on all the light-textured soils. Its flowers and leaves furnish some forage for cattle and sheep.

The devils-pincushion is the only cactus that is abundant. It is a large globose plant with long, strong thorns that protrude only a few inches above the surface of the ground. Its distribution is limited to comparatively lower ground of medium or heavy texture. The large treelike *Opuntia* is a conspicuous branching plant that grows in only a few places.

Blueweed (a blue sunflower), tansymustard, and Russian-thistle are apparently the most common and important weeds in cultivated fields and along roadsides. Blue loco is widely distributed on all the soils, and its purple bloom is very conspicuous. It causes the well-known locoed (crazy) condition in horses and sheep. It may be eradicated from pastures by cutting or pulling it out. A few varieties of milkweed grow on the medium- or heavy-textured soils. These are poisonous and are sometimes browsed by young lambs.

As indicated by the large encroachment of snakeweed on grasslands, much of the land has been overgrazed. The original carrying capacity of the range was probably as high as 20 or 25 head of cattle to the section, but now, especially in the southern half of the area, overgrazing has thinned the stand of the nutritious grasses, and plants of low grazing value have taken up much of the land, with a consequent reduction of the carrying capacity. Care should be taken not to allow too many cattle on a given acreage and not to allow close bunching of cattle during periods when the ground is wet and the grass easily tramped out. Alternation of pastures to give the grasses opportunity to reestablish themselves is recommended and practiced by some ranchers.

A valuable feature of the short-grass range, especially of buffalo grass, is that it cures on the ground after maturity and affords a valuable range feed even when dry; that is, on drying on the ground after maturity the nutritive qualities are not lost.

IRRIGATION AND WATER SUPPLY

Many ranchers who do not have special pumps for irrigating, water garden patches by using the home windmill. Every ranch has one or more windmills to pump water for the home and for

livestock. A few pumps for irrigating were installed about 1907, but these were abandoned. Some were installed later, about 1924, and the number is increasing. There are about 55 pumps now in operation. The wells are either drilled or dug partly and completed by drilling. The drilled wells range from 8 to 18 inches in diameter and from 40 to 80 feet in depth. A few of the wells are equipped with turbine pumps, but most of them have the centrifugal type. The centrifugal-type pumps are installed in wells that have been dug to or just below the surface of the water, and the pump is placed near the water surface. The pumps are operated by tractors and by various other types of kerosene, distillate, or oil engines. The pump wells are reported to yield from 200 to 700 gallons a minute, with a drawdown ranging from 3 to 20 feet. The wide variation in yield and drawdown is owing in large part to the difference in the methods of construction of the wells and the type of equipment used. This is due, also, to variations in the water-yielding capacity of the formations reached by the wells. The water supply for this underground reservoir comes from the rains that fall on the Llano Estacado of New Mexico. The rain waters seep below the surface and are ponded in the sand, gravel, and clay layers of the tertiary deposits. These tertiary sediments are variable. Some allow free movement of water and readily give up water for pumping, whereas others of more dense character give up water so slowly that there is a large drawdown even with windmill pumping. No data are available on costs of pumping or quantity of water applied to each crop. Comparing a 6-inch pump equipped with a Diesel motor and assuming that oil could be obtained at a low cost from nearby producing wells, with electrically operated pumps in the Salt River Valley of Arizona, the cost should be about \$2 an acre foot for a lift between 40 and 60 feet. The height to which water for irrigation is pumped is about 15 feet in some places, although in other parts of the area it is more than 40 feet. The quantity of water necessary for crop production varies greatly on different soil areas. Because of the variability of the thickness of the soil material overlying caliche and the variability of the porosity of the caliche, different locations require different quantities of irrigation water and different methods of application for conservation and efficient use of the water.

The different crops also require different quantities of water. At present, irrigation is largely for the purpose of supplementing rainfall. The yearly rainfall, averaging about 14 inches, comes largely during the growing season, and this amount, if efficiently utilized, is sufficient to produce a number of crops suited to this general region. Yields, however, are appreciably increased by artificial applications of water and, depending on the seasonal rainfall, the feed crops and cotton are given from 2 to 4 applications of water, and truck crops may be watered more often. All irrigation is by the furrow method. The quantity of water used in crop production on a shallow or very porous soil may be cut to a minimum by use of short runs in furrows and by many comparatively small applications or applications that add just enough water to sufficiently moisten the soil to the caliche or to the depth of root penetration. Because of the porous character of the carbonate of lime caliche formations and the scattered bodies of irrigable soils, there is no danger of water-log-

ging the land in this area. Although many of the soils are high in carbonate of calcium and probably contain other mineral salts, it seems probable that no alkali accumulations will endanger crop production on these permeable soils. Valuable information regarding irrigation practices in New Mexico may be obtained from Bulletin 149 of the New Mexico Agricultural Experiment Station.²

The supply of water for the present or future development of irrigation is derived entirely from rain water that collects, through seepage, in the unconsolidated underlying formations.³ It is difficult to estimate the number of acres of land that may be irrigated from this underground reservoir. At present, with the scattered locations of the pumps, no depletion of the water supply is noticeable.

SOILS AND THEIR INTERPRETATION

Climatic forces, together with natural vegetal cover, are primary factors in the development of soil characteristics. Moisture, temperature, and aeration are especially effective because of their influence on oxidation, leaching, translocation, and accumulation of soil-forming material. The climatic and biological influences acting on soil material tend to form similar characteristics in all the soils of a given climatic region. There are, however, a number of local factors that modify the natural climatic influences. These may be relief, drainage, erosion, time of accumulation of soil material, local differences in vegetation, soil texture, and the character of the geological parent material from which the soils have been formed.

The Lovington area lies in the dark-brown soils belt on the high plains, in a semiarid climate where the short grasses and low bunch grasses have been the most influential vegetation in the development of the normal soils. The Llano Estacado on which the soils have developed, stands from slightly above the surrounding plains to more than 300 feet above them, and from 3,000 to 4,000 feet above sea level. It probably stands above the surrounding plains because of the action of a larger amount of erosive forces in adjoining sections or because of the resistance to erosion caused by the indurated caliche (calcium carbonate layer). The hard layer of limestone-like caliche rock, which varies in both hardness and thickness, underlies nearly all the soils. In many places this rock is very massive, 20 feet or more thick, and is apparently of the hardness of unweathered limestone rock. In other places it is of fragmental character and may be shattered when struck with a shovel. Little or no stratification is apparent, and the carbonate of lime layer is massive or uniform rather than interspersed by layers of soil of different material. In most places it becomes less dense with depth. The origin of this material probably dates into the Tertiary period of geological history.

Nearly all the soils of the area have been developed from materials that have been deposited on this caliche limerock. Presumably the soil-forming materials are all water-laid deposits of Tertiary or Quaternary periods. The deposits of soil material, however, have

² BLOODGOOD, D. W., and CURRY, A. S. NET REQUIREMENTS OF CROPS FOR IRRIGATION WATER IN THE MESILLA VALLEY, NEW MEXICO. N. Mex. Agr. Expt. Sta. Bull. 149, 48 pp., illus. 1925.

³ NYE, S. S. SHALLOW GROUND-WATER SUPPLIES IN NORTH LEA COUNTY, NEW MEXICO. N. Mex. State Engin. (Bien.) Rept. (1928-30) 9: 363-387, illus. 1930.

been varied in character, there probably having been material of one kind deposited at one time and greatly different materials at another time. These differences of parent material are probably responsible for the different textural features in the soils of the several series occurring in this area.

The Lea series represents the normally developed soils. A combination of warm temperature, low rainfall, normal drainage, and a cover of short grasses and their effect on a highly calcareous soil material are largely responsible for their development. Lea loam has an 8-inch topsoil layer of dark-brown friable loam which has been leached of carbonate of lime and of various soluble salts but apparently has not a developed structure. It contains a network of many grass roots. Below the surface soil and extending to an average depth of 12 inches the material is very similar, but it is slightly heavier in texture and is mildly calcareous. Between depths of 12 and about 22 inches, the material is brownish-gray or grayish-brown silty clay loam, with a slightly developed granular structure. Many grass roots extend through these upper horizons. A large number of holes made by earthworms are apparent from a point near the surface to a depth of 22 inches. Some of the casts are dark coated, and others have gray coatings, indicating that worms have traveled both up and down in the soil and have caused the translocation of certain soil materials. Below an average depth of 22 inches and extending to an average depth of 38 inches the soil material is dull-gray limy silty clay loam. It is slightly more firm or bound into an indurated mass by the carbonate of lime. The material in this horizon breaks into irregularly shaped nodulelike clods. At a depth ranging from 16 inches to more than 6 feet, but averaging about 3 feet, this material grades into fragmental or solid caliche limestone.

The very soluble materials have been largely leached, perhaps from the entire profile, the carbonate of lime and equally soluble materials have been leached from the surface soil and partly from the subsoil, and part of the lime has accumulated in the soil just above the cap rock. The leaching has been brought about by an annual rainfall of about 14 inches. The organic matter, or humus, that has been preserved in the soil has come from grass roots and leaves. When the grass particles decompose to a colloidal condition, their colloids have a negative reaction or charge. The excess of calcium in the soil, having a positive charge, combines with the colloidal humus, the union preserving the humus in the soil rather than allowing it to be washed out. This soil-forming phenomenon is responsible for the formation of the, potentially, most fertile soils of the area.

Apparently on the shallower land, moisture has not been so adequately stored for plant use, a less abundant growth of grass has been produced, and the soil is less dark but includes many reddish-brown areas. Most of these redder areas occur south, southwest, and northwest of Lovington. In the eastern part of the area, where there is slightly more relief, the silty clay loam of the Lea series occupies more pronounced drainageways where more moisture has collected. This moisture, in turn, has produced a heavier plant growth, with a consequent greater accumulation of humus, thus developing a darker soil. Within the playas soil water has been abundant, and before the playas were very deep, the heavy grass growth,

because of adequate water supply, was responsible for the development of a blacker soil. The subsoils of these heavier soils, in most places, show greater development of clay and a columnar structure. The soil areas mapped in the Lea series, as is true of all soils mapped in the area, range in depth from about 16 inches to more than 6 feet. The depth to which calcium compounds and soluble salts have been leached ranges from 4 to 18 inches, with an average of about 10 inches.

The Reagan soils represent a younger stage of development, or a development from parent material very rich in calcium carbonate. Reagan loam, to a depth of 4½ inches, is grayish-brown highly calcareous mellow loam impregnated with a mat of grass roots. Apparently there has been no structural development. Below this and extending to a depth of 12 inches, the material is grayish-brown friable highly calcareous silt loam containing many grass roots, and it has a slight tendency toward an irregular or nodular clod structure. This development in structure is doubtless caused by the large concentration of carbonate of lime that tends to bind and cement the soil aggregates into a rough clodlike concretionary form. A few worm casts darker than the surrounding soil occur. Below a depth of 12 inches and extending to a depth of 22 inches, the subsoil is brownish-gray highly calcareous light silty clay loam. Here the nodular clod structure is more pronounced than in the layer above. This layer contains many grass roots and a few worm casts. Below a depth of 22 inches and extending to an average depth of 24 inches, gray marl of silty clay loam texture occurs as a mass of firmed or very slightly cemented material. This crumbles easily into irregularly shaped nodular clods. This layer contains a few grass roots and a few brown threadlike stains in places where grass roots have decayed.

With the marllike material are a few carbonate of lime nodules and fragments of hard caliche, and below a depth of 34 inches the material grades abruptly into either a fragmental hard caliche limestone, or a massive porous caliche limestone. Most of the land has a dense cover composed of the tall and black grama grasses, and there is also much needlegrass.

This soil occurs chiefly in areas lying slightly lower than the adjoining soils. It is possible that in some areas much of the soil material has been accumulated recently by washing of highly calcareous material into these lower areas. The soil occurs in both large and small bodies. It may be progressing in development toward Lea loam, and present characteristics indicate that, ultimately, a dark-colored soil will form. The amount of carbonate of lime in the surface soil varies considerably from place to place. As a rule, the darker areas are the most productive. The texture of the topsoil, although normally a loam, is in places a light clay loam. In the heavier textured bodies the soil particles incline to bind together on wetting and drying.

Reagan fine sandy loam conforms closely in profile to Reagan loam. Most of it occurs as circular blisterlike areas or as ridges that range from slightly to as much as 3 feet above the adjoining soils. The native vegetation is largely grasses and *Yucca*. Needlegrass is common, which is possibly due to its encroachment following excessively heavy grazing. The surface soil is pink, pinkish

gray, or grayish brown, is everywhere highly calcareous, and as a rule contains many fine and small hard caliche fragments, these being larger, and in places nodular, in the lower layers. In many places a soft or fragmental caliche extends from a depth of about 4 feet to a depth of more than 10 feet before the hard caliche occurs. In some areas there is a pronounced accumulation of nodules and caliche fragments at a depth ranging from 30 to 40 inches beneath the surface, and below this the material is of a somewhat pink color, is highly calcareous, but contains comparatively few stony fragments. In these latter places the soil may extend to a depth ranging from 4 to more than 6 feet before the hard caliche occurs.

Springer loam is characteristic of another stage of soil development. This soil occurs in large and small irregular bodies and is similar in general topographic features to Lea loam. It supports the same kind of short-grass vegetation. It differs from Lea loam in that the parent material is different. Springer loam has an 8-inch topsoil of rich-brown or slightly reddish brown friable loam that is thickly matted with grass roots but apparently has no structural development. Between depths of 8 and 18 inches, the material is reddish brown and is slightly heavier than the surface soil. This layer contains many fine grass roots, but wormholes are few and difficult to observe. Below this and extending to a depth of 48 inches the material is pink or pale yellowish red, slightly compact, and of heavy clay loam texture. It contains many mottlings or splotches of gray carbonate of lime, which have formed in seams or as soft nodular accumulations. A number of darkened seams or surfaces in holes indicate a formation of iron oxides and transferred organic matter throughout the fine earth. There are some red, rust-colored, and yellow iron stains, also a large number of wormholes, in this layer. The casts are varied in color, some being the color of the soil, some darker, and some gray coated. A moderate number of fine grass roots are present, and some structure has developed. The material breaks into irregularly shaped clods having a few polished or smooth surfaces. The lower part of this layer contains some gypsum in association with the carbonates. Below a depth of 48 inches is the parent material of pale yellowish-red sandy clay. It is slightly compact and in most places free of carbonates. It effervesces slightly with hydrochloric acid in places where white splotches of gypsum and some carbonates are present.

This description is typical of much of the Springer loam, but included with it are large areas that have a more compact layer at a depth ranging from about 10 to 20 inches. In such areas leaching of carbonate of lime has been more complete, and no effervescence occurs with hydrochloric acid in the upper 10 or 12 inches of soil material.

Springer loam is a normally developed soil in this area and shows the effects of weather on a given original deposition. The effects of oxidation have released the salts, carbonates, and some of the other minerals. The gypsum has been leached to a great depth, and the carbonates occur more strongly concentrated just above the gypsum. Iron oxides are more noticeable in the B horizon, and in the surface horizon the original red color is masked by the accumulation of organic matter. Translocation of clay to the B horizon has taken place, the dispersion of which probably has been caused by the presence

of sodium. The up-and-down translocation of material by worms is apparent in this soil.

Scab land consists of thick beds of caliche, either soft, hard, or fragmental, over which a shallow layer of soil materials has been imposed, either by the early stages of soil development or by the action of wind carrying materials from other soil areas.

Table 5 shows the results of pH determinations for three soils from the Lovington area, New Mexico. These determinations were made in the laboratories of the Bureau of Chemistry and Soils by the hydrogen-electrode method.

TABLE 5.—*Results of pH determinations on three soils in the Lovington area, New Mexico*

Soil type and sample no.	Depth	pH	Soil type and sample no.	Depth	pH
Reagan loam:	<i>Inches</i>		Lea loam, overblown phase—Con.	<i>Inches</i>	
500901.....	0 - 4½	8.27	500908.....	14-19	8.02
500902.....	4½-12	8.27	500909.....	19-27	8.03
500903.....	12 - 22	8.35	500910.....	27-38	8.19
500904.....	22 - 34	8.27	Springer fine sandy loam:		
500905.....	34+	8.60	500927.....	0 - 6	7.83
Lea loam, overblown phase:	<i>Inches</i>		500928.....	6-11	7.42
500906.....	0 - 10	8.35	500929.....	11-34	7.29
500907.....	10 - 14	8.19			

Table 6 gives a comparison of several characteristics of three soils in the Lovington area, New Mexico.

TABLE 6.—*A comparison of important characteristics of three soils in the Lovington area, New Mexico*

Soil type	Depth	Moisture-holding capacity	Moisture equivalent	Calcium carbonate	Total soluble salts	Organic matter
Reagan loam.....	<i>Inches</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Parts per million</i>	<i>Percent</i>
	0 - 4½	50.4	23.1	12.54	560	4.20
	4½-12	52.6	23.4	19.50	550	8.13
	12 - 22	57.2	25.4	43.62	600	1.71
	22 - 34	52.6	24.8	58.48	471	1.49
	0 - 8	55.1	22.7	.50	700	2.40
Lea loam.....	8 - 12	59.7	24.0	3.75	700	2.06
	12 - 22	56.7	23.7	15.90	700	1.63
	22 - 38	51.6	21.2	34.49	700	1.26
Springer fine sandy loam.....	0 - 6	.....	.....	.05	320	1.27
	6 - 11	.....	.....	.08	450	1.88
	11 - 34	.....	.....	.27	425	1.47

SUMMARY

The Lovington area is located in southeastern New Mexico, in the east-central part of Lea County. It includes the lands beneath which water lies at a depth of about 50 feet below the surface. The area includes 1,315 square miles of uniformly smoothly undulating or flat grass-covered plains on the Llano Estacado, the southerly extension of the high plains division of the Great Plains area. The elevation ranges from 3,500 to 4,000 feet above sea level.

The average annual rainfall is 14.05 inches. The dry moderate climate is healthful.

Livestock raising is the principal agricultural enterprise. Forage, to supplement range grasses, is produced principally under dry-

farming conditions and to a small extent under irrigation. Some minor crops are produced to supply the local demand. Important oil-producing areas lie within the area.

The mature soils of the area have dark-brown topsoils moderately leached and free of soluble salts and carbonates. The subsurface layer is characterized by an accumulation of calcium carbonate. The various soils have developed under practically identical climatic conditions, but they differ largely in accordance with the character of parent materials, in texture, and in topographic position, the last feature governing, to a considerable extent, moisture conditions and native vegetation.



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